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INTERNATIONAL PRELIMINARY EXAMINATION REPORT (PCT Article 36 and Rule 70)

Applicant's or agent's file reference RJ/LTN14846	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/GB 03/04676	International filing date (day/month/year) 30.10.2003	Priority date (day/month/year) 30.10.2002
International Patent Classification (IPC) or both national classification and IPC G06K19/06		
Applicant THE SECRETARY OF STATE FOR TRADE AND IND. ET AL		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 6 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 5 sheets.

3. This report contains indications relating to the following items:

I ☒ Basis of the opinion

II ☐ Priority

III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability


IV ☐ Lack of unity of invention

V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

VI ☐ Certain documents cited

VII ☐ Certain defects in the International application

VIII ☐ Certain observations on the international application

Date of submission of the demand 26.04.2004	Date of completion of this report 25.02.2005
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Geiger, J-W Telephone No. +49 89 2399-2584



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB 03/04676

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

3-13	as originally filed
1, 2	received on 13.09.2004 with letter of 07.09.2004
1a	received on 02.11.2004 with letter of 28.10.2004

Claims, Numbers

1-16	received on 02.11.2004 with letter of 28.10.2004
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Drawings, Sheets

1/1	as originally filed
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2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	3-9, 11-15
	No: Claims	1,2,10,16
Inventive step (IS)	Yes: Claims	
	No: Claims	3-9, 11-15
Industrial applicability (IA)	Yes: Claims	1-16
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1 Reference is made to the following documents:

D2: WO-A-0137266

D3: DE-A-19812812

The document D4 was not cited in the international search report.

D4: DE-A-10015097

2 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1 and 2 is not new in the sense of Article 33(2) PCT.

2.1 The document D4 discloses (the references in parentheses applying to this document):

An identification device (cf paragraph [0001]) including in a single coded layer (cf fig. 4, part 9) first, second, and third machine-readable identification codes (cf fig. 4, 6, 7, and 8, parts 13, 14, 15) arranged along length, width, and height dimensional axes and each provided with coding elements extending along their respective dimensional axes, orthogonal to one another (cf paragraphs [0038 - 0046]).

It is remarked that cutting the coded structure of one of figures 6, 7, or 8 into three orthogonal directions (length, width, and height dimensional axes) then three different structures (eg. characters 13,15 or geometric forms 14, 17 or periodic sequences of 13,15 and 14,15) will be present which can and may be interpreted by some users as codes.

Hence D4 discloses first, second, and third machine-readable identification codes arranged along length, width, and height dimensional axes, orthogonal to one another.

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EXAMINATION REPORT - SEPARATE SHEET**

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- 3 The features of claims 3 and 4 do not add any inventive step to the subject-matter to which said claims refer.

Document D3 discloses as an additional identification coding of a standard printed code a fluorescent marking (cf col. 11, lines 3 - 44: "Als zusätzliche Kodierung wird ... unterschiedlicher physikalischer Grössen ausgeführt").

A skilled person wishing to integrate more information into the identification device of D4 would therefore regard it as a normal design option to combine the features of D3 with the subject-matter of D4 in order to solve the problem posed.

- 4 The subject-matter of claims 5 - 8 lacks an inventive step under PCT Article 33(3) as being obvious over D4. D4 discloses inter alia the feature of micro-sized characters (cf paragraph [0042]: "Mikroschriftzeichen") which are used as an additional security feature since standard copy machines are not able to resolve such small structures. A skilled person knowing from D4 that small features will act as an additional security, will therefore adjust without applying inventive efforts the dimensions of the identification device in an appropriate way, hence arriving at sizes as claimed. A selection of dimensions can only be regarded as inventive, if the claimed dimensions present unexpected effects which is not the case in the present application. Hence no inventive step is present in the subject-matter of claims 5 - 8.
- 5 The limitations of claim 9 have already been addressed in the rejection of claims 1 - 8 above. Claim 9 is therefore rejected on similar grounds.
- 6 The subject-matter of claim 10 lacks novelty under PCT Article 33(2) since D2 discloses a security device including on an exterior surface a coded item having coding units in order of nanometers (cf page 1 and page 35, lines 3 - 15).
- 7 The features added by the dependent claims 11 - 15 are either known from D4 (claims 12 - 15) or are considered to be straightforward design alternatives (claim 11) which would be within the abilities of a skilled person working in the field of security devices. Thus these design alternatives do not justify an inventive step.

- 8 The subject-matter of claims 16 lacks novelty under PCT Article 33(2) as being anticipated by D3:
- D3 discloses a detection apparatus including location means (cf col. 10, lines 14 - 23: passing a banknote through optical sensors and detecting the end of the banknote renders to detect the position of security means on the banknote) for locating a device on an article and reading means (cf col. 5, lines 7 - 67: measurement of capacity formed with the security means) separated from the location means (since the location means and the reading means detect different physical parameters, both means are separated in a certain amount from each other) wherein the reading means including micro computerised measuring machine (capacity measurement is very sensitive to the electrodes distance hence it is regarded as a micro measurement and realised with a computer, see col. 5, line 68 - col. 6, lines 26) and central means (cf col. 5, line 68 - col. 6, lines 26) operable to control the reading means to read the codes.

IDENTIFICATION DEVICE, ANTI-COUNTERFEITING
APPARATUS AND METHOD

The present invention relates to apparatus and a method for providing anti-counterfeiting features to security articles, such as security paper, banknotes and the like. The present invention also relates to an identifier for identifying articles and the like.

In the field of document and article security, it has been known for a long time to
5 provide security devices in the articles to be protected, in which devices are intended to act as a verification tool for verifying the authenticity of the article and also as a deterrent to deter would-be counterfeiters, achieved by the apparent difficulty in reproducing the security device. Examples are the metal thread provided within banknotes, watermarking, holograms and so on. A general problem with such security devices is that over time
10 would-be counterfeiters are either able to duplicate the device or are able to counterfeit the device sufficiently well that others can be fooled into believing that the security device itself is genuine and therefore that the article is also genuine. For example, it has been known to replicate the metallic thread incorporated in banknotes by a coloured ink or even by a pencil mark on the top surface of the paper product. In the case of cashiers, at a bank
15 or at a shop, such measures have on occasions proven successful in fooling the cashier into accepting a counterfeit banknote or cheque.

US-A-5,298,731 discloses a data processing system and method to combine two alphanumeric data streams into a single bar code representation. A first conversion table converts a first sequence of alphanumeric characters into a corresponding sequence of first
20 bar code characters having character widths modulated in a first direction. A second conversion table converts a second sequence of alpha numeric characters into a corresponding sequence of second bar code characters having character heights along a substrate plane modulated in a second direction orthogonal to the first direction. The system outputs a composite bar code sequence to represent both the first and the second
25 sequence of alphanumeric characters. A third data stream may also be provided.

WO 01/37266 discloses a method for reading a three-dimensional data storage device, including a) providing a data storage medium constituting a three-dimensional matrix and a plurality of dye molecules dispersed therein, wherein the dye molecules are capable of a fluorescence change induced by multiple-photon excitation; b) inducing a
30 fluorescence change of the dye by multiple-photon excitation under conditions effective to write an information code in a selected portion of the medium; c) inducing one-photon

1A

excitation in the fluorescence-changed dye; d) detecting a fluorescence emission in the one-photon excited dye portion; and e) correlating the fluorescence with the dye molecules contained in the selected portion that are detectably altered effective to retrieve the information code is disclosed. The process can be repeated to write multiple layers of
5 information. The data storage methods and media are particularly useful for storing or archiving a series of three-dimensional images or information in the form of barcodes, medical bracelets, and identification tags.

CA-A-2,404,853 discloses a printed data carrier comprising a printed surface and at least one partial printed surface enclosed thereby on all sides. The surface and partial
10 surface are printed using photogravure and are visually contrasting on account of the different thicknesses of the colour coating applied thereto.

The present invention seeks to provide an improved security device, improved apparatus for detecting such a device, and as a result of detecting the authenticity of articles, and a new identification device.

15 According to an aspect of the present invention, there is provided an identification device as specified in claim 1.

Advantageously, the first, second and third identification codes are located substantially orthogonal to one another.

Most preferably, there is provided a fourth identification code which has a physical
20 characteristic different from that of the first, second and third codes (where the latter is provided). This different physical characteristic may be a different chemical composition, electrical characteristic, magnetic characteristic, colour or texture.

Advantageously, the identification device has dimensions of the order of micrometers or less in at least one direction. Most preferably, the device has dimensions of the order of micrometers or less in at least two directions. The preferred embodiment has coding units of the order of nanometers in at least one and most preferably two directions.

The advantage of the complex identification codes (that is in at least two or more non-parallel directions) disclosed herein provide many orders of magnitude of codes greater than a simple one-dimensional code of the type used in conventional barcodes. A three or four dimensional code of the type disclosed herein can provide such a large number of configurations that it is practically impossible to break the encoding with existing computer processing systems.

The advantage of a coding system having the dimensions given herein is that it becomes very difficult for would-be counterfeiters to manufacture the identification device and even harder to duplicate the device. This can make it particularly advantageous when used as a security device for high value items, such as banknotes and other security paper, artworks, jewellery, gem stones and so on.

According to another aspect of the present invention, there is provided a security device for an article as specified in claim 10.

The coded item may be a barcode and the coding units may be individual bars of the barcode. Advantageously, the coded item provides a code in at least two dimensions, most preferably in at least three dimensions.

According to another aspect of the present invention, there is provided detection apparatus as specified in claim 16.

CLAIMS

1. An identification device including in a single coded layer first, second and third machine-readable identification codes arranged along length, width and height dimensional axes and each provided with coding elements extending along their respective dimensional axes.

2. An identification device according to claim 1, wherein the first, second and third identification codes are located substantially orthogonal to one another.

3. An identification device according to claim 1 or 2, wherein there is provided a fourth identification code which has a physical characteristic different from that of the first, second and/or third codes.

4. An identification device according to claim 3, wherein the different physical characteristic is a different chemical composition, electrical characteristic, magnetic characteristic, colour or texture.

5. An identification device according to any preceding claim, wherein the identification device has dimensions of the order of micrometers or less in at least one direction.

6. An identification device according to any preceding claim, wherein the device has dimensions of the order of micrometers or less in at least two directions.

7. An identification device according to any preceding claim, including coding units of the order of nanometers in at least one direction.

8. An identification device according to any preceding claim, wherein the device is not visible to the naked eye.

9. An identification device including first and second machine-readable identification codes arranged along different dimensional axes to one another, said first and second codes not being visible to the naked eye, and a further machine-readable identification code which has a physical characteristic different from that of the first and second codes.

10. A security device for an article, including on an exterior surface of the device a coded item having coding units of the order of nanometers in at least one dimension.

11. A security device according to claim 9, wherein the coded item is a barcode and the coding units are individual bars of the barcode.

12. A security device according to claim 10 or 11, wherein the coded item provides a code in at least two dimensions.

13. A security device according to claim 10, 11 or 12 wherein the coded item provides a code within a single layer which includes first, second and third codes arranged along length, width and height dimensional axes.

14. A security device or identification device according to any preceding claim designed for provision on or in a currency banknote or other security paper.

15. A banknote, security paper, or artwork, jewellery or a gemstone including an identification device or a security device according to any preceding claim.

16. Detection apparatus for detecting an identification or security device according to any one of claims 1 to 14, including locating means for locating a device on an article and at least one reading means separate from the locating means, wherein the reading means includes an atomic force microscope or other micro computerised measuring machine and central means operable to control the reading means to read the codes.